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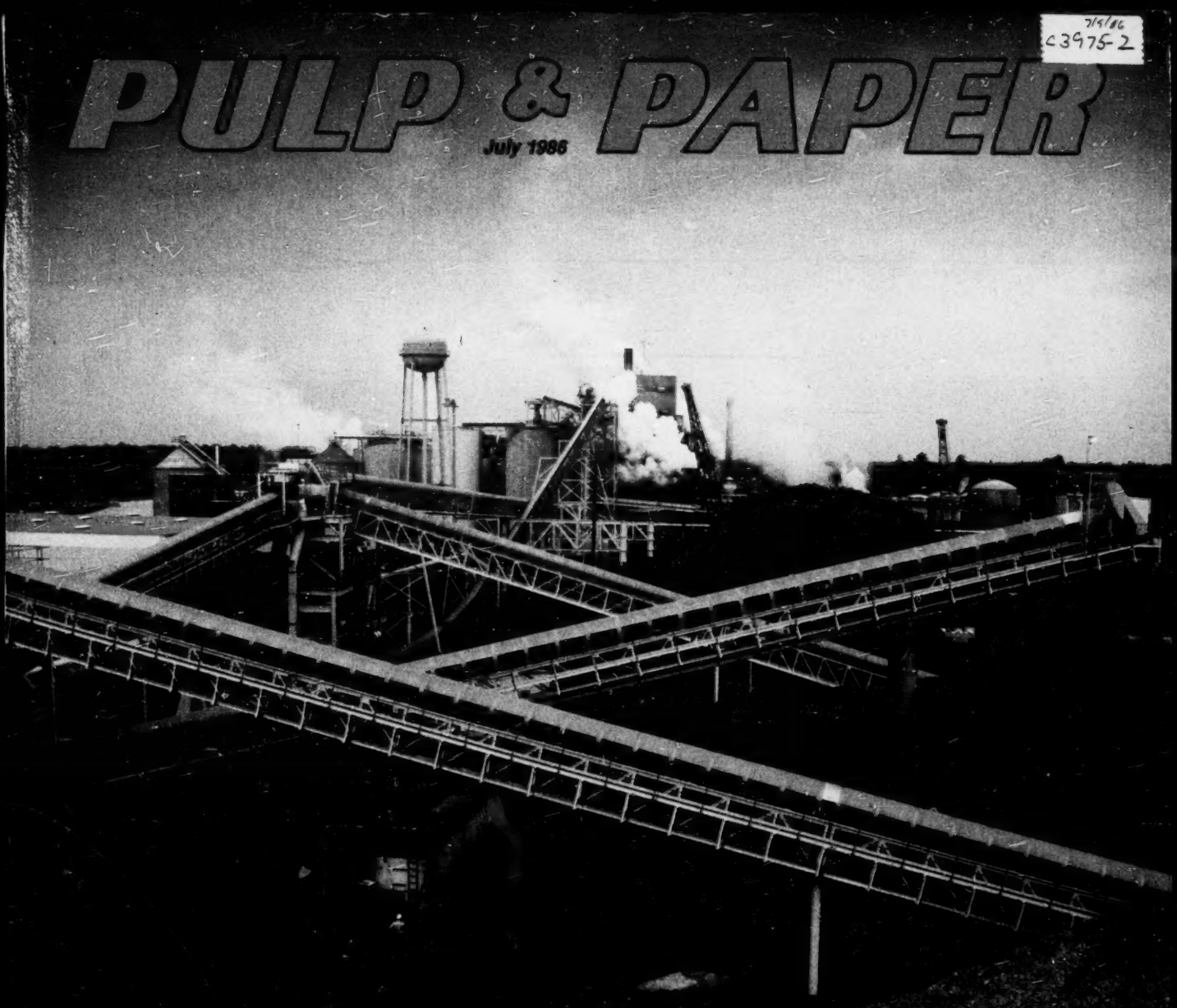
# PULP & PAPER

July 1986



**PULPWOOD PROCESSING:** NEW WAYS TO PURCHASE WOODYARD EQUIPMENT

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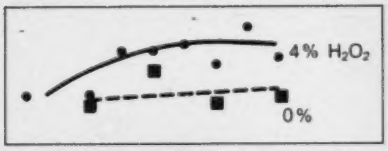


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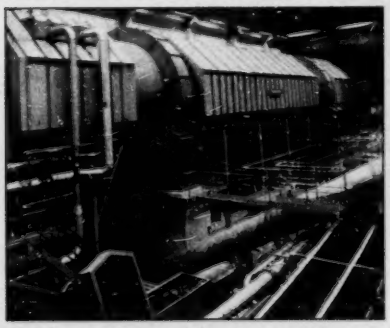

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***Wood preparation area at Stone Container Corp.'s kraft linerboard mill in Florence, S.C.*** **(Photo courtesy of Stone Container Corp.)**

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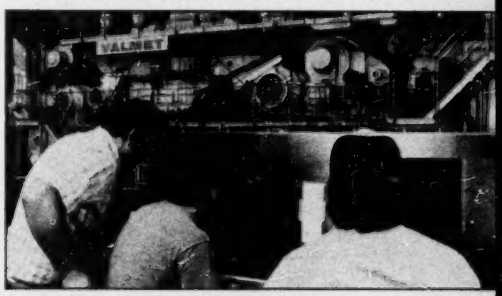



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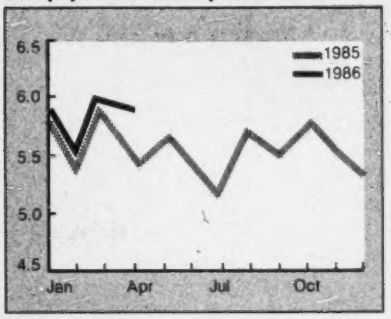
**U.S. paper and board production**




**U.S. production** of paper and paperboard totaled 5.8 million tons in April, up 7.2% compared to the year before, according to the American Paper Institute. Fueled by continued strong demand, the production rate topped the record 1984 level for the fourth straight month in April.

**Among major grades**, unbleached packaging continued to lose ground in the face of competition from plastics and sluggish markets for shipping sacks, while coated paper also remained weak. Uncoated freesheet rose a strong 7.6% compared to last year, however, and the paperboard grades all showed solid gains between 4% and 6%. Reflecting the decline in the dollar, containerboard production for export jumped 27.6%. Containerboard inventories were 17% below year-earlier levels, the Fibre Box Assn. said, while corrugated box shipments rose to 25.174 billion ft², a new record for the month.

**Canadian newsprint** shipments rose to 800,000 metric tons in April, a gain of 5.8% over April 1985. Operating rates rose to 92%. Canadian pulp shipments jumped a strong 14.6%, to 650,000 tons, while operating rates stood at 90%, compared to 79% last year. ■

| | Latest month (000 short tons) | | % change from year ago | Annualized year-to-date (000 short tons) | % change from year ago |
|---|---|---|---|---|---|
| **PAPER & PAPERBOARD PRODUCTION**[1] | | | | | |
| Newsprint | Apr. | 451 | 5.6 | 5,511 | 0.3 |
| Uncoated groundwood (s) | Apr. | 120 | −2.4 | 1,461 | −3.4 |
| Coated paper (s) | Apr. | 473 | −8.3 | 5,957 | −6.3 |
| Uncoated free sheet (s) | Apr. | 839 | 0.8 | 10,367 | 7.6 |
| Other printing/writing | Apr. | 120 | 6.2 | 1,445 | 18.1 |
| Total packaging and other paper (s) | Apr. | 443 | 9.1 | 5,188 | −1.0 |
| Tissue | Apr. | 433 | 9.9 | 5,048 | 3.2 |
| **Total paper** | **Apr.** | **2,880** | **2.5** | **34,977** | **1.5** |
| Unbleached kraft paperboard | Apr. | 1,446 | 12.6 | 17,104 | 4.1 |
| Semichemical medium | Apr. | 443 | 7.8 | 5,222 | 5.0 |
| Bleached paperboard | Apr. | 361 | 5.9 | 4,292 | 6.4 |
| Recycled paperboard | Apr. | 681 | 19.1 | 8,022 | 5.4 |
| **Total paperboard** | **Apr.** | **2,932** | **12.4** | **34,640** | **4.8** |
| **Total U.S. paper and paperboard output** | **Apr.** | **5,812** | **7.2** | **69,617** | **3.2** |
| **PULP, WASTEPAPER & FIBER**[2] | | | | | |
| Total U.S. woodpulp production | Mar. | 4,856 | 0.2 | 56,434 | 2.2 |
| Market pulp production | Mar. | 636 | 4.3 | 7,388 | 3.9 |
| Wastepaper consumption at paper/board mills | Mar. | 1,415 | 4.0 | 16,402 | 5.1 |
| Pulpwood consumption (cords) | Mar. | 7,478 | −2.3 | 90,476 | 2.6 |
| **CONVERTED PRODUCTS STATISTICS**[3] | | | | | |
| Corrugated box shipments (billion ft²) | Apr. | 25.174 | 11.2 | 93.122[6] | 6.0 |
| Containerboard inventories at U.S. box plants and mills | Apr. 1 | 2,517 | −16.7 | | |
| **INTERNATIONAL TRADE**[2] | | | | | |
| U.S. paper imports (including products) | Mar. | 945 | −9.7 | 11,378 | 1.3 |
| Imports of Canadian newsprint | Mar. | 698 | −8.0 | 8,251[6] | 1.2 |
| U.S. paper exports (including products) | Mar. | 416 | 17.2 | 4,506 | 14.6 |
| Exports of unbleached kraft linerboard | Mar. | 195 | 27.5 | 2,024 | 20.2 |
| Exports of woodpulp | Mar. | 414 | 3.8 | 4,493 | 21.8 |
| Norscan pulp inventories[4] | Apr. 30 | 1,025 | −35.5 | | |
| Norscan pulp operating rates[4] | Apr. | 86% | 90% | 94% | 89% |
| **CANADIAN STATISTICS**[5] *(reported in metric tons)* | | | | | |
| Total newsprint shipments | Apr. | 800 | 5.8 | 2,956[6] | −1.8 |
| Operating rates | Apr. | 92% | 91% | 92% | 95% |
| Inventories held by U.S. consumers | Apr. 30 | 1,411 | −7.6 | | |
| Other paper/board shipments | Apr. | 531 | 17.7 | 1,983 | 11.1 |
| Woodpulp shipments (export only) | Apr. | 650 | 14.6 | 2,550[6] | 18.4 |
| Operating rates | Apr. | 90% | 79% | 91% | 88% |

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

# CORRUGATING MEDIUM: Low capacity growth should help operating rates in 1986

**Grade structure:** Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. In 1985, 78% of corrugating medium was made from semichemical furnish (which normally contains at least 20% recycled fiber) and 22% was "bogus" medium made from wastepaper. Basis weights of corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft². Standard sheet weight is 26 lb, which accounts for more than 80% of production. Recycled medium for equivalent uses is normally produced in slightly higher weights.

**Production/capacity:** Production of corrugating medium declined by 0.8% in 1985 from the previous year to 6.5 million tons. Production was hurt by a 0.4% decline in corrugated box shipments plus extensive mill downtime to reduce excess inventories built up during 1984.

Semichemical medium production declined 1.6%, but recycled medium output increased 2.2%—perhaps reflecting a competitive advantage held by recycled mills due to low wastepaper costs. This resulted in about a 94% operating rate for semichemical mills and a 91% rate for recycled mills.

**Outlook:** The outlook for corrugating medium this year and beyond is brighter. Through April, corrugating medium production was running about 6% ahead of a year ago. For all of 1986, however, corrugating medium output is projected to rise 4.1%.

Corrugated box shipments for the first four months were up 6% but are projected to increase 3.5% for the year. Some of the recent strength in both medium and corrugated box shipments is believed to reflect inventory building at the converting plant and end user level in anticipation of recent price increases. U.S. industrial production so far is up only 1% to 2%, and economists (as measured by *Blue Chip Economic Indicators*) are looking for a 3.3% increase for all of 1986.

No new semichemical medium machines have been announced in the U.S., and capacity is expected to rise only 1.4% this year and 2.2% in 1987. Since the American Paper Institute capacity survey was released, Harriman Paperboard Corp.'s 250-tpd mill in Harriman, Tenn., has been shut down. It may be reopened under new ownership. In addition, Willamette Industries Inc. has announced plans to shut down a 256-tpd machine at its Albany, Ore., mill in the summer of 1987.

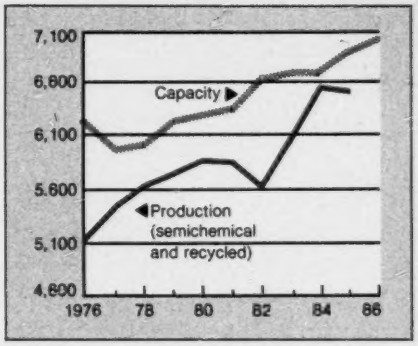
Recycled corrugating medium capacity, however, is growing at a faster rate and will jump 1% this year and 8.1% in 1987. The big increase in 1987 reflects the startup late this year of a 425-tpd jump machine being converted from linerboard by Chesapeake Corp. at its West Point, Va., mill.

**Prices:** Corrugating medium prices began to erode in the second half of 1984 when an attempt to lift the price of 26-lb semichemical from $310 to $340 did not take hold. By the second half of 1985, prices had declined to about $240/ton and lower in the eastern U.S. independent box market. This year, transaction prices have begun to recover and by late spring reached about $260/ton (vs a list of $270 to $280). A further $30/ton price increase was announced for June 1, although it may not become fully effective until the end of the summer.

Medium prices have shown less pickup in the latest market recovery than have linerboard prices, and medium has been selling at more than its normal $10/ton differential to liner (at least in terms of transaction prices). Among possible explanations: Only a small amount of medium is exported and demand has not been helped by the upturn in overseas markets; most medium machines have been running well (in contrast to production problems at some liner mills); low wastepaper prices have increased the cost competitiveness of recycled mills; and exchange rates have done the same for the Canadian corrugating medium mills that ship into the U.S.

Price history at year-end for 26-lb semichemical medium in eastern U.S. is as follows: 1980, $260; 1981, $290/260; 1982, $240; 1983, $280; 1984, $310; 1985, $240; 1986 May, $260. ■

## SUPPLY/DEMAND (000 tons)




## FORECAST (000 tons)

| | 1984 | 1985 | 1986e |
|---|---|---|---|
| Production[1] | | | |
| Semichemical | 5,169 | 5,084 | 5,285 |
| Recycled | 1,385 | 1,416 | 1,480 |
| **Total** | **6,554** | **6,500** | **6,765** |
| Capacity[1] | | | |
| Semichemical | 5,252 | 5,415 | 5,493 |
| Recycled | 1,524 | 1,555 | 1,570 |
| Utilization rates (%) | | | |
| Semichemical | 98.4 | 93.9 | 96.2 |
| Recycled | 90.9 | 91.1 | 94.3 |
| Imports[2] | 104 | 65 | 90 |
| Exports[1] | 149 | 184 | 200 |
| Apparent U.S. consumption | | | |
| 000 tons | 6,509 | 6,381 | 6,655 |
| lb/capita | 55.0 | 53.5 | 55.3 |
| GNP ratio | 1.86 | 1.79 | 1.81 |

1. American Paper Institute data.
2. Dept. of Commerce data.

## TOP PRODUCERS (000 tpy)

| | Annual capacity | | | Market share (%) |
|---|---|---|---|---|
| | Semi-chem | Recycled medium | Total | |
| **1.** Stone | 652 | 168 | 820 | 11.6 |
| **2.** O-I | 628 | — | 628 | 8.9 |
| **3.** Weyco | 620 | — | 620 | 8.8 |
| **4.** Inland | 190 | 250 | 440 | 6.2 |
| **5.** Willamette | 240 | 120 | 360 | 5.1 |
| **6.** Mead | 335 | — | 335 | 4.7 |
| **7.** IP | 330 | — | 330 | 4.6 |
| **8.** CCA | 115 | 165 | 280 | 4.0 |
| **9.** Va. Fibre | 260 | — | 260 | 3.7 |
| **10.** PCA | 260 | — | 260 | 3.7 |

Market share of top five companies: **40.6%**
Market share of top ten companies: **61.3%**
Total U.S. capacity (1986):
**7.083 million short tons**

1. Reflects 31% interest in 100,000-tpy Groveton Paper Board.
2. Includes 50% interest in 130,000-tpy machine at Sonoco Products' Harstville, S.C., mill.
3. Excludes 78,000 tpy of capacity at Sturgeon, Ont.

*CAPITAL SPENDING*

# U.S. companies stick to spending increases

With business conditions generally expected to improve this year, U.S. pulp and paper companies are sticking with plans to boost capital spending in 1986 for the fourth year in a row, according to two recent surveys.

The paper industry will spend $8.85 billion on new plant and equipment this year, up 3.8% from 1985, according to the Commerce Dept.'s Bureau of Economic Analysis. While still up from last year, the latest figures signal a slowing in the rate of capital spending growth. A 3.8% increase this year would be the smallest since the recession ended in 1983. Industry outlays rose 21.8% in 1984 and 18.3% last year. Total spending for 1985 was $8.53 billion, according to the BEA's final revision.

The 3.8% increase shown in the latest BEA survey compares favorably with last fall's survey, which forecast an increase of 3.6% for 1986. In fact, the increase is larger than the percentage difference shows because the BEA has revised its capital goods deflator (a measure of inflation) drastically downward following a comprehensive revision of national income and product accounts in December. Last fall, capital goods inflation was expected to be 2.7% in 1986. The current survey cuts that figure in half, to 1.3%. The final revision for 1985 lowered the deflator from 3.4% to only 1.4% for all of last year.

**Larger increase?** In contrast to the BEA study, McGraw-Hill Economic's recent spring survey of capital spending plans shows paper industry capital expenditures rising 7.8% in 1986, to $9.20 billion. McGraw-Hill's latest report seems to reflect an optimism not seen in the BEA study—the two surveys had reached similar conclusions last fall. At that time, McGraw-Hill forecast that spending would increase to $8.58 billion in 1986.

McGraw-Hill's estimate for next year's spending has grown consistently more pessimistic since last year. In its 1985 spring survey, McGraw-Hill forecast that 1987 spending would drop only 2.6%. In the fall, that downturn rose to 9.8%. Now paper industry spending is expected to drop 11.4% in 1987 to $8.15 billion. Preliminary plans for 1988 show capital outlays dropping 9.8%, to $7.35 billion, according to the McGraw-Hill report.

**Company plans.** A survey of 29 major U.S. companies shows a mixed bag of spending plans and strategies for 1986. Overall, the companies in the accompanying table plan to lower 1986 capital spending 3.7% compared with last year, and some chief executives said that changes in the tax code might lower their spending further. Several companies will reduce spending after completing major projects this year, but this is offset somewhat by others that are beginning major new spending programs.

Chesapeake Corp. will cut spending 52% this year after installing a new linerboard machine at its West Point, Va., mill last year. Now in the final year of an eight-year capital spending program, International Paper Co.'s outlays will decrease 25% this year. IP completed its Mobile, Ala., white paper conversion in 1985, but the company still has a major modernization under way at Pine Bluff, Ark.

Scott Paper Co. will complete a five-year spending program this year and expects spending to drop 22% compared with 1985. Scott completed a major energy project in Mobile, Ala., last year and will complete a new machine installation at Skowhegan, Maine, and a power system modernization at Chester, Pa., this year. Georgia-Pacific Corp. finished major grade conversion projects at Crossett, Ark., and Monticello, Miss., last year and will reduce spending about 24% in 1986. G-P still has a new machine installation under way at Zachary, La., for completion this year. Also installing new paper machines this year are Bowater Inc., Consolidated Papers Inc., and Hammermill Paper Co.

James River Corp. and Fort Howard Paper Co. are leading the group of companies that plans to raise spending. James River has expanded its

**Capital spending plans at major U.S. paper/forest products companies for 1986.**

| Company | 1986 | 1985 | Percent change |
|---|---|---|---|
| Boise Cascade | 300 | 350 | −14.3% |
| Bowater | 220 | 358 | −38.5 |
| Champion International | 450 | 403 | 11.7 |
| Chesapeake | 44 | 91 | −51.6 |
| Consolidated Papers | 157 | 138 | 13.8 |
| Federal Paper Board | 60 | 47 | 27.7 |
| Fort Howard Paper | 350 | 198 | 76.8 |
| Georgia-Pacific[1] | 330 | 435 | −24.1 |
| Great Northern Nekoosa | 160 | 113 | 41.6 |
| Hammermill Paper | 245 | 195 | 25.6 |
| International Paper[2] | 385 | 516 | −25.4 |
| James River | 280[3] | 218 | 28.4 |
| Kimberly-Clark | 350 | 426 | −17.4 |
| Longview[4] | 22 | 35 | −37.1 |
| Louisiana-Pacific | 150 | 153 | −2.0 |
| Manville Forest Products | 25 | 20 | 25.0 |
| Mead | 200-225 | 239[5] | −5.9 |
| Packaging Corp. of America | 26.8 | 22 | 21.8 |
| Pentair | 50 | 62 | −19.4 |
| Pope & Talbot | 10.7[6] | 23 | −53.5 |
| Potlatch | 109 | 63 | 73.0 |
| Scott Paper | 400[7] | 514 | −22.2 |
| Sonoco Products | 50 | 38 | 31.6 |
| Stone Container | 60 | 47 | 27.7 |
| Union Camp | 240 | 240 | — |
| U.S. Gypsum (USG Corp.) | 150 | 165 | −9.1 |
| Wausau Paper | 10.5 | 7 | 50.0 |
| Weyerhaeuser | 450 | 396 | 13.6 |
| Willamette Industries[8] | 35 | 37 | −5.4 |

1. Pulp and paper sector only. 2. Pulp, paper, and packaging only. 3. Estimate based on $1.4 billion total 1986-90 spending plan. 4. Plant and equipment only. 5. Excludes $60 million for timber purchase. 6. Capital commitment at end of 1985. 7. Estimate based on $800 million planned spending for 1986-87. 8. Manufacturing improvements only.

capital spending plans to $1.4 billion for the 1986-90 period. Fort Howard plans to spend $950 million through 1988 on its new recycled tissue mill at Rincon, Ga., and other projects.

After a year or so of digesting major expansion projects or acquisitions, several other companies also plan to boost capital expenditures in 1986. After a successful divestiture program to reduce debt from its acquisition of St. Regis Corp., Champion International Corp. will boost capital outlays 11% in 1986. Stone Container Corp. plans to increase spending 28% in 1986, following a series of major acquisitions over the past few years. Following completion of major expansion projects in 1984, Great Northern Nekoosa Corp.'s spending will climb 42% in 1986. Weyerhaeuser Co. will raise outlays 14%. ■

*EXPANSIONS*

## Bato to make newsprint at F.F. Soucy or Bear Island

Bato Co. plans to install a newsprint machine somewhere, but it hasn't yet been decided which mill will be chosen. The company's first choice is its F.F. Soucy Inc. facility in Rivière-du-Loup, Que.

If Soucy gets the nod, the cost of the expansion would be C$230 million. Participating in the expansion project would be Soucy, Dow Jones & Co., and Rexfor, a Quebec government agency involved in forestry. Each would own an as yet undetermined amount of shares. Dow Jones and Rexfor are partners with Bato in one of the two machines at the Soucy mill, with the other machine being owned entirely by Bato.

The machine installed at Soucy would have a capacity of 200,000 tpy, doubling the mill's present papermaking capacity. Rexfor would make wood supplies available and would take a share in the new machine of between 10% and 33.3%.

The big question in the Soucy project involves possible government financing. Bato's president, Peter Brant, said that he needs federal and provincial government aid and, if he doesn't get it, he will install the machine at Bato's Bear Island Paper Co. mill in Ashland, Va.

Brant wants federal loan guarantees as well as provincial aid with wood supplies. Casting a shadow over his plan is the decision last year by Ottawa to deny aid to a proposed Donohue Inc.-New York Times Co. newsprint expansion project at Clermont, Que. This denial generally was believed to signify a new federal reluctance to continue subsidizing industry projects. ■

## Saugbrugs makes a new proposal for Matane mill

The Norwegian paper company Saugbrugsforeningen sent a written counterproposal to the Quebec government on a possible greenfield mill on the Matane Peninsula, Charles Ciaccia, Quebec's Energy & Resources Minister, told the National Assembly recently.

According to Ciaccia, the counterproposal—a result of earlier negotiations between the province and the company—will be examined by his agency. After that is completed, negotiations can resume. Talks were interrupted earlier in the year because of discussions in Norway about a possible merger of Saugbrugs and another company.

The company has never discussed its plans for Matane publicly, but observers feel it is considering building a supercalendered uncoated groundwood or coated paper mill with capacity for 180,000 metric tpy in the Matane area. The proposed mill is expected to cost in the neighborhood of C$350 million. ■

## Champion studying machine rebuild at Bucksport, Maine

Champion International Corp. said it has contracted with E.C. Jordan Co. to perform a preliminary engineering study and capital cost estimate for rebuilding No. 4 machine at the 1,160-tpd coated groundwood mill at Bucksport, Maine. E.C. Jordan will study raising machine speed and converting the unit from coated basestock to coated paper.

While still under St. Regis ownership, the mill had planned a similar $6-million project to boost No. 4's speed 200 fpm to 3,000 fpm and speed up No. 2 off-machine coater by 500 fpm to 3,500 fpm. That expansion project was postponed from its 1986 target date following Champion International's acquisition of St. Regis in 1984. ■

*LABOR*

## Spending programs cut, shutdowns mulled at GN

Intent on cutting costs significantly, Great Northern Paper Co. announced it will cancel or reduce many spending programs and is studying possible paper machine shutdowns. The company also said that it will lay off more employees as part of a program outlined in January to cut staffing by 1,200 to 1,400 over the next several years (*P&P*, Mar., p. 27).

The amount of money that will be cut out of capital spending budgets has not yet been determined, but it is sure to be significant. Among items that will be cut are the studies on possible modernization of the Millinocket, Maine, mill. The company had been looking into a possible pulp mill modernization and rebuild of No. 11 paper machine.

Modernization of the East Millinocket mill will not be affected by the cuts. Work being done at East Millinocket, budgeted at $155 million, includes pulp mill improvements, rebuild of two paper machines, and a new finishing system. The work is to be completed in mid-1987.

But aside from that project, very little is sacrosanct. According to a general notice to employees, "capital expenditures and repair jobs in the mills and woodlands will be curtailed except for those necessary to ensure the safety of personnel, the protection of property, legal compliance, or the continuation of operations."

GN said No. 4 groundwood specialties machine at Millinocket will be shut down June 30 as previously announced. "The advisability of shutting down additional narrow paper machines that may not be profitable in the long run" is being considered as well.

In the woodlands area, "nursery, reforestation, and herbicide programs will be ended as quickly as practical." Other woodlands activities will be studied for possible reductions.

**Staff to be reduced.** Referring to capital spending and woodlands programs being cut, the announcement said "employees associated with all of the above activities whose services are no longer required will be separated from the payroll." GN also said that it will review other projects to find ways of cutting its salaried work force—now over 700—by 15%. ■

er. When Valmet made its unsuccessful takeover bid for Beloit Corp. late last year, state approval was in doubt. But the fact that both Valmet and Wärtsilä are Finnish companies could alter the government's view. The transaction must also be approved by the workers involved in both companies, and some taxation problems have to be ironed out.

The proposed deal with Wärtsilä is the most recent stage in Valmet's world expansion plan. It purchased Dominion Engineering Works of Canada two years ago. Valmet also formed a new company with KMW of Sweden last year. The decision to merge its paper equipment business with Wärtsilä grew out of a plan to streamline Finnish shipbuilding. Wärtsilä and Valmet have also agreed to form a new shipbuilding group, and Wärtsilä will own 70% of that company.

Valmet is also expanding its share of the process automation market with its purchase of a 20% stake in Sentrol Systems Ltd. of Canada. Of Valmet's $1.5 billion in annual sales, Valmet Automation contributes $200 million. The automation group manufactures Damatic digital distributed automation systems for process control in the forest, chemical, and food industries, as well as power plants. Valmet Automation also sells production management systems for paper mills along with measuring sensors and transmitters, including the Kajaani bleaching sensor line and Valmet consistency transmitters.

Sentrol Systems, which has US$30 million in annual sales, specializes in sensor-based supervisory control for the paper industry. Sentrol's premier product is its Sentry systems line, including sensors and control software for regulating paper quality. The two companies said they will provide "the most complete range of process control products available" for the pulp and paper industry worldwide. ■

*WOOD PRODUCTS*

## Canadian forest fire could be costly—worst fire in years

The provinces of Newfoundland and New Brunswick have been particularly hard hit by a series of forest fires that consumed over 60,000 acres of woodland this spring. The situation improved when cool, wet weather aided the efforts of the firefighters trying to control the spread of the flames.

Although damage assessment is still preliminary, major fire damage in New Brunswick occurred to mature timber stands in the area between Newcastle and Bathurst and may affect wood supply to mills in that region. In Newfoundland, much of the burned land was scrub forest and therefore useful only as a future timber source. ■

## Canada retaliates against U.S. wood tariff

While protesting that it does not want a trade war with the U.S., Canada has imposed some tariffs of its own as a reaction to new U.S. duties on cedar shakes and shingles. Both governments seem to want to put this issue aside and continue talks aimed at reducing trade barriers between the U.S. and Canada.

After the U.S. rejected Canada's demand for compensation for the tariff, Canada imposed duties on certain publications and computer parts from the U.S. These duties would raise about the same money for Canada ($61 million) as the U.S. tariffs add to shake and shingle prices in the U.S. Both countries' tariffs took effect on June 6.

The U.S. tariff will start at 35% for 30 months. It will be 20% for the next 24 months, falling to 8% for the last six months. During the tariff period, U.S. shake and shingle mills are to use profits from the higher domestic prices to improve their processes.

Finance minister Michael Wilson explained Canada's counter move: "our objective is to bring home to the U.S. the costs of protectionism, while avoiding measures that will worsen our own situation."

Even before the tariff took effect, shake and shingle prices soared in parts of the U.S. Dealers in the San Francisco Bay area reported prices up 20% in the first week after President Reagan announced the 35% duty.

■ U.S. trade officials will investigate a complaint that Canada subsidizes its softwood lumber industry. Should the Commerce Dept. agree with U.S. lumber producers' charges, it could order up to $1 billion of trade penalties on $4 billion worth of annual imports. The Commerce Dept. said that it will rule by July 3 on a petition by the U.S. Coalition for Fair Lumber Imports seeking a 27% countervailing duty on Canadian softwood lumber entering the U.S. duty-free. ■

*INTERNATIONAL TRADE*

## Europe's output in 1985: little change in production

Production of paper and board in 1985 reported by the European Paper Institute for its 13 member countries was 45 million metric tons, a marginal increase of 0.5% over the very high levels reached in 1984. Paper and board consumption in the EPI countries was 42 million tons, a decrease of 0.5%. (See accompanying table for production and consumption of each country.)

The EPI also reports output by major paper and board grades (000 tons): graphic paper, including newsprint, 22,695 (up 1.5%); packaging papers and corrugating, 12,618 (down 1.0%); sanitary, household, and special papers, 3,382 (down 2.0%); board, not including building board, 6,374 (up 2.0%).

Pulp production last year, according to the EPI, totaled 2.56 million tons, down 0.2% from 1984. Leading pulp-producing countries (000 tons) were: Austria, 1,196 (up 8.5%); Finland, 7,739 (up 0.2%); France, 1,939 (down 5.1%); Fed. Rep. Germany, 2,048 (down 0.6%); Norway, 1,835 (up 5.1%); and Sweden at 9,079, down by 1.0%. Pulp consumption of 2.94 million tons was 0.7% above consumption in 1984. ■

**1985 paper/paperboard production and consumption for 13 western European countries.**

| Country | Production | Consumption |
|---|---|---|
| Austria | 2,127 | 982 |
| Belgium | 841 | 1,629 |
| Denmark | 321 | 927 |
| Finland | 7,445 | 1,296 |
| France | 5,343 | 6,675 |
| Germany' | 9,150 | 10,590 |
| Ireland | 26 | 281 |
| Italy | 4,587 | 5,244 |
| Netherlands | 1,904 | 2,495 |
| Norway | 1,604 | 583 |
| Sweden | 7,003 | 2,002 |
| Switzerland | 1,019 | 1,161 |
| U.K. | 3,681 | 7,826 |
| **Total** | **45,051** | **41,691** |

1. Fed. Rep. Germany
Source: European Paper Institute.

# GOOD NEWS FOR BLEACHERS: Ample supply, no new price hikes

**Consumption.** Although few chemical pulp mills have been built recently and none are planned, use of bleaching chemicals still rises. Last year, consumption was flat until a late-season rush due to improved pulp markets that are still in evidence today. Many analysts hold a bullish view for the rest of 1986. Current stimuli are the opposite of those causing a poor market in 1983-84: a weakening dollar, improving domestic consumption, and reduced inventories. All seem to be shaping up well—so well that market pulp prices have begun to take off.

Pulp mills are using more chemicals because they are running at higher utilization rates. A few have recently taken downtime, mainly to reduce inventories. *P&P*'s bleaching survey (see p. 47) indicates that use of chlorine, caustic, and sodium chlorate all rose slightly in 1985 compared with 1984—a trend that will continue in 1986 if operating rates stay high.

The rise in consumption can also be attributed to two new pulp mills in 1985. New capacity is planned at eight U.S. sites and two in Canada. No new fully bleached chemical pulp mills will open in 1986.

Substitution chemicals such as oxygen, peroxide, and chlorine dioxide (in chlorination) remain popular. Growth of oxygen use in the first caustic extraction stages seems to be leveling after tremendous success earlier in the decade. However, renewed attention is being paid to oxygen delignification. *P&P*'s survey found at least three lines employing new postdelignification processes using oxygen in 1986, while three mills expressed interest in adding these units in the near future. This confirms an industry desire to bleach pulp in shorter sequences with less effluent. Perhaps the driving force will not be stricter government regulations or pulp market conditions, but production needs and self-initiated pollution abatement for internal cost reduction.

Peroxide use, too, is growing. DuPont experts have noted that some 30 mills in the U.S. use hydrogen peroxide in the first or second extraction or en route to storage. As experience with hydrogen peroxide in such uses rises and price stability is retained, the trend should continue.

Chlorine dioxide substitution in chlorination is at the crossroads in bleaching. A few mills use moderate to high substitution, but most seem to favor only small amounts (below 1% of chlorine). Although almost 80% of the mills practice some substitution, the growth of chlorine dioxide use in chlorination is and will remain nearly flat. The competition among substitution chemicals does not favor chlorine dioxide because its use is limited to the unit producing it. When pulp mills began using chlorine dioxide in the C-stage, they were pushing their generators to full capacity. The cost was greater and might have augmented other substitution chemicals (peroxide and oxygen use reduces chlorine dioxide consumption). In any event, the survey found little interest in using higher substitution rates in the future.

*TABLE 1:* **U.S. and Canadian consumption and prices of chemical pulp bleaching chemicals.**

| U.S. | Chlorine | Caustic | Chlorate | Peroxide |
|---|---|---|---|---|
| 1985 consumption (000 tons) | 1,600 | 1,880 | 210 | 9 |
| % change from 1984 | 10 | −4 | — | 5 |
| 1985 dollars per ton | 195[1] | 175[2] | 420[3] | 645[4] |
| % change from 1984 | — | −40 | — | — |
| % change for 1986 | — | 10 | — | — |
| **Canada[5]** | | | | |
| 1985 consumption (000 tons) | 506 | 499 | 186 | 1.8 |
| % change from 1984 | 0.8 | 1 | −7.2 | — |
| % per year growth, 1986–88 | 2 | 0.5 | 12 | |

1. f.o.b. Gulf Coast, freight equivalent. 2. 50% liquid basis, f.o.b. Gulf Coast, freight equivalent. 3. Bulk container, f.o.b. works (now listed in crystal form in 450-lb drums at $0.27/lb.). 4. 50% solution, tankcar, freight equivalent. 5. From *Corpus Chemical Report*.

**Price, availability.** There have been some changes in price and availability of chlorine, caustic, and sodium chlorate, but they will not be a great concern to pulp mills now or in the immediate future. The price of chlorine rose 20% in the past seven months, with delivered cost reaching $130/ton. Producers maintain that on an ECU basis, the rise does not make up for previous declines, particularly since the price of caustic is still down. Mills using chlorine will find the price reflecting demands for polyvinyl chloride and vinyl chloride monomer, which are related to the housing and automotive industries. The recent hikes may also be due to reduced chlorine capacity. Since late 1984, over 400,000 tpy has been taken out of the market, with three plant closures in 1985 and only one major expansion announced for 1986 (OxyChem's Taft, La., plant).

Chloralkali producers are also developing membrane technologies to cut production costs and make higher-quality grades. Operating rates were 84% in 1985—up three points over 1984—and the jump should be similar this year. Caustic demand is still low. Oversupply and slow markets have made it impossible to boost prices.

The sodium chlorate market has been oversupplied in the past 18 months. The overall supply situation has helped mills to get $50 to $100/ton discounts off lists, depending on the receiving point. Expansion of three plants and startup of a new facility, all in Canada, have changed market attitudes, especially if the above developments continue. Two U.S. plants have closed and only one has expanded. The marketplace is further complicated by power cost advantages (for Canadians) for production of sodium chlorate and government subsidies for power and transportation. Many producers are sending the dry product south for conversion to the delivered form (liquid), aided by mills installing equipment that can receive the dry product, saving several dollars per ton. It would be "unrealistic" to even imagine a price rise in 1986, as one producer put it.

Substitution chemicals are also in ample supply, and no price hikes are likely for the rest of 1986. ■

# EFFORTS IN CHEMICAL PULP BLEACHING TECHNOLOGY EMPHASIZE CUTTING COSTS

## *P&P*'s third annual survey of bleaching equipment finds fewer new systems; emphasis is on washing, process control, chemical additions

By MICHAEL J. DUCEY

Bleaching chemical pulp has been and continues to be a major strategic area for reducing production costs. While equipment suppliers slowed their offering of new systems during the past 12 months, that can be construed as a tribute to the last ten years of product development and market acceptance. North American pulp mills have improved their operations with dynamic and static mixers, sensors and controls, innovative chemical additions, etc., gaining a more efficient process and reducing operational costs. Yet the market is by no means saturated, and suppliers can look forward to a strong, competitive environment in finishing out the 1980s.

Before a discussion of process equipment and chemical consumption, a word of thanks is extended to those who have participated in the survey during the last four years (*P&P*, Nov. 1983, p. 53; Oct. 1984, p. 56; June 1985, p. 56). Some 150 people from mills, research centers, and allied industries in North America have made great contributions to this effort. Each receives a copy of *P&P*'s chemical consumption report, which now represents over 75% of the bleached tonnage in the U.S. and Canada. The work will be updated in the fall of 1986 and could incorporate the European countries by the end of the year.

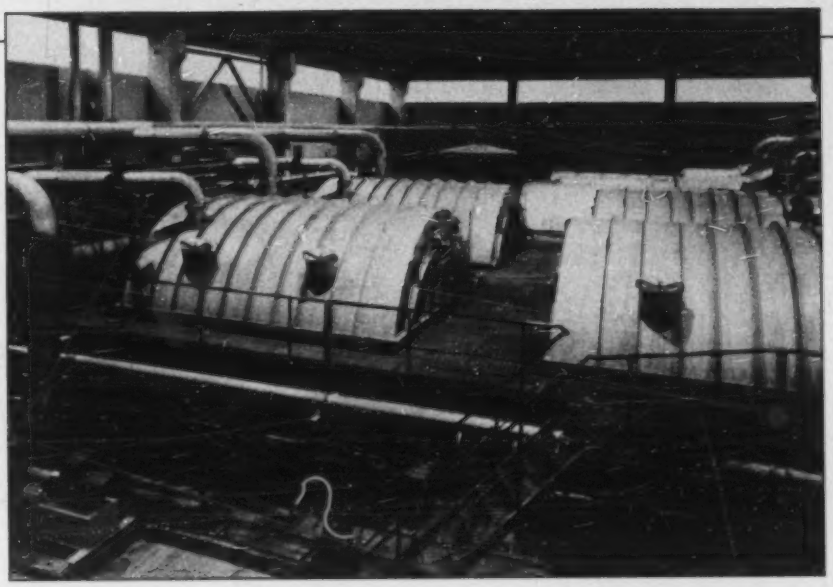
**CHEMICAL CONSUMPTION.** As stated in the chemical report (p. 39 of this issue), an incremental rise in consumption was recorded for chlorine, caustic, and sodium chlorate in 1985 (about 2% over 1984, total). Oxygen, peroxide and sulfur dioxide, used in smaller quantities, experienced healthy gains in consumption due to their ability to reduce bleaching costs while maintaining or improving quality. As it stands now, consumption of commodity chemicals follows production, and production did not change much from the previous year. Two new pulp mills, Champion International Corp.'s hardwood market pulp mill in Quinnesec, Mich., and Union Camp Corp.'s plant in Eastover, S.C., helped offset the consumption loss due to efficiency gains made by the mills with new equipment and modification of the bleaching sequence. According to *Pulp & Paper Project Report*, total bleached kraft capacity expansions announced for 1986 are close to 200,000 tpy for the U.S. and 35,000 metric tpy for Canada. Another 1 million tpy could be online by 1990. Pulping expenditures by the industry amount to $1.6 billion, or 20% of the total capital spending program for the next three years. Bleaching improvements account for nearly 30%.

**MIXING.** The four major suppliers, Kamyr, IMPCO, Sunds Defibrator, and Rauma-Repola (represented in North America by Beloit), have had a lot to cheer about since they introduced new mixing equipment six years ago. Dynamic mixers were accepted quickly (relatively speaking for the paper industry) and most of the bleaching lines covered in the survey have had at least one installed for chlorination, oxidative extraction, or chlorine dioxide stages. The mixers have really proven to be worthwhile. Their cost justification is fixed inside of a year, product quality enhancement is evident (mostly in brightness gains), energy costs do not affect overall bleaching cost, damage to the fibers is minimal, and chemical consumption is reduced by more efficient mixing (the major factor in the ROI equation).

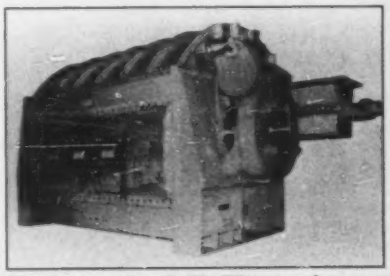
Dynamic mixers have allowed mills to re-evaluate totally their bleaching sequences. In the chlorination stage, mixers can help with the premixing or sequential addition of chlorine dioxide, particularly in high-substitution situations. In caustic extraction, mixers provide

*TABLE 1:* **Survey participation breakdown.**

| | |
|---|---|
| Individuals | |
| Mill | 110 |
| Supplier | 45 |
| Other | 4 |
| Number of lines | 104 |
| Tonnage represented | (capacity) |
| U.S. | 16,500,000 short tpy |
| Canada | 6,500,000 metric tpy |



**Four Pro-Feed washers situated in a parallel line produce 1,000 a.d. metric tpd of softwood kraft and 1,100 a.d. metric tpd of hardwood kraft. The units were installed in 1985.**



**The Compaction Baffle Filter can be installed in any pulp mill process in single or multiple stages that involves the washing of chemicals from pulp.**

the vehicle for oxygen enrichment. In latter-stage chlorine dioxide bleaching, mixers help to squeeze out the last bits of color, effectively increasing final brightness.

Single stages have not been the only beneficiary. A few mills have had the opportunity to form parallel bleaching lines out of a single line. Short-sequence bleaching is now a consideration for mills of all sizes, particularly for those deciding on replacing an existing line. The shortened process uses less energy, chemicals, and manpower (maintenance). More mills will use dynamic mixers to accomplish this modification. The survey found at least three mills actively studying this for near-future application.

Mills that have installed a mixer seem very satisfied with a single stage and may not need another one unless they are evaluating the entire line for replacment. Therefore, the growth of the market for dynamic mixers may flatten over the next several years. The challenge for suppliers now lies in convincing smaller mills to install the equipment. Capital investment costs are holding smaller mills back since unit cost, installation, and startup are fairly expensive. Space constraints are also restricting purchasers for some bleacheries.

Another factor that is influencing mixer sales is competition from pumps. Kamyr's MC pump is proving to be an effective mixer, seemingly applying the shear forces necessary for proper fluidization (mixing).

There have been a few installations of static mixers in North America supplied by Komax Systems. These mixers have a unique element design that forms vortices, or backmixing, which has been effective for the mills that have employed it. There are no moving parts, the unit is easy to install (fitting right into a pipe), and it is inexpensive—approximately one-fortieth of the cost of a dynamic mixer. Sales have been slow, mostly due to light acceptance in the marketplace. Static mixers have received a bad reputation over the years for separating fluids instead of mixing, but the Komax unit is sound, according to the mills that use them. The benefits are similar to those of dynamic mixers but on a smaller scale. They do not reduce shives as well, but they do reduce chemical costs (for oxidative extraction) and improve quality. It is too difficult to estimate just how many static mixers will be sold in the coming years, but with wider use comes wider acceptance, especially in the pulp industry.

**OXYGEN IS BACK.** The survey showed clearly that oxygen delignification (first stage) is once again the No. 1 choice of mills installing new systems. Over the past five years, most new lines have been either conventional five-stage (Champion International Corp.'s Quinnesec mill, Great Northern Nekoosa Corp.'s Leaf River mill), or displacement (Crown Zellerbach's Camas, Wash., mill, International Paper Co.'s Georgetown, S.C., mill). History helped dictate this trend, with Chesapeake's rather unique design ($C_D$) receiving lukewarm attention (although the system continues to run well) and, of course, the initial problems at IP's Ticonderoga, N.Y., mill, currently under fire from Vermont environmental authorities.

But the situation has changed. The survey reveals that two oxygen systems will be installed by year-end (at Consolidated Papers and at Champion's Pensacola, Fla., mill). Several survey participants also indicated their preference for oxygen delignification when asked about choosing a new system. The two being installed this year are employing the parallel or split sequence retrofit currently used by two other mills in the U.S.

When the participants who preferred oxygen delignification were asked to explain their preference, various reasons were offered. The cost justification was based on lower operational costs attributed to less chemical cost. Cheap oxygen applied in heavy doses (combined with metal inhibitors) reduces the kappa number to half that of conventional systems. This means far lower chemical charges in the latter stages, which reduces bleaching cost (oxygen is still very cheap) and effluent

treatment cost. Effluent components discharged are typically half that of conventional systems.

Capital cost for oxygen delignification is fairly high. Process equipment includes a large reaction vessel and powerful transport equipment (bleaching consistencies are in the medium range). Survey participants liked the idea of having a common oxygen reactor installed before a split sequence. This concept may boost sales efforts by allowing the systems to be offered as retrofits where space allows.

Other pretreatment systems have been explored in recent years. The most significant one in North America is the 25-tpd ozone reaction vessel now operating at the Weyerhaeuser research facility. The vessel is the largest of its kind and should provide the data needed to evaluate a commercial system. There has been no further word from the Japanese on their development efforts for an ozone generator, which is a major concern due to the rather high-cost techniques employed today for onsite ozone generation. Another research effort being directed for commercial application is nitrogen dioxide as a bleaching agent. This chemical is attractive because of its high reactivity with lignin, but its effect on pulp strength has been questioned. Both ozone and nitrogen dioxide produce effluent-free byproducts, which is a major driving force in continuing research.

**OTHER NEW LINES.** IMPCO is currently marketing a new bleaching line utilizing their Compaction Baffle Filter, an innovative vacuum washing vessel. The filter, operating under pressure, is smaller than other washers and can be received factory-assembled. So far the idea has been accepted by two mills (Mead Corp.'s Chillicothe, Ohio, complex and as part of IP's modernization program at Mobile, Ala.). The system is said to be cheaper (15% to 20%) than other short-sequence plants available today. The bleaching line would consist of three washers in combination with the High-Shear mixers introduced a few years ago.

The Compaction Baffle Filter (see *P&P*, Nov. 1985, p. 65) is designed to use less water and power while discharging less effluent. Inlet consistency is 4%, compared with the 1% to 2% levels currently employed in most systems. Discharge consistency is 13%. This reduces piping and valve requirements as well as horsepower consumption and lowers effluent discharge due to the water reduction. Other advantages claimed by the supplier include lower maintenance, less electrical cost, reduced foaming, less odor, and many others. *Pulp & Paper* hopes to publish a full report on one of the first commercial applications in the near future.

Chasing IMPCO in this washer market is Rauma-Repola, supported by Beloit in North America. Its Pro-Feed washer, like the IMPCO unit, requires no barometric dropleg, allowing for a low-to-the-ground design. Inlet and discharge consistencies are also similar to the IMPCO design. The concept promotes shorter bleaching lines, less effluent, and requires less power and space. The equipment has been successful worldwide but there are only a handful of installations in North America. Beloit mentioned that most inquiries from mills specify production increases for future capacity expansions as well as ongoing interest in turnkey systems. Many mills are actively pursuing washers and mixers, it is said, but the decision-making process is rather slow.

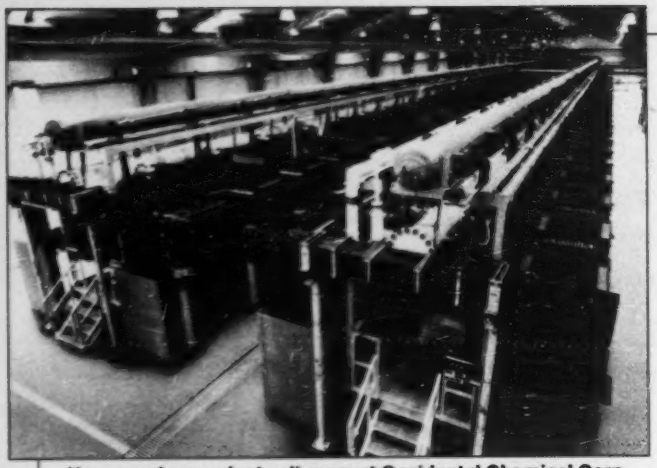
Sunds Defibrator has begun marketing efforts on the displacement press as an alternative to conventional vacuum filters. The first unit is being installed in a Swedish mill. Advantages of the displacement press include high washing efficiency, low building level, low washwater requirements, and smaller filtrate tanks.

**CHEMICAL GENERATING.** With all the recent sequence modifications, equipment for onsite chemical generators has also been a point of interest. The latest equipment entries have been in chloralkali units from MoDo Chemetics and a soon-to-be-announced system from Lurgi. These units utilize innovative membrane technologies similar to the ones accepted by the major chloralkali producers. One MoDo unit was sold two years ago to Procter & Gamble in Wisconsin, and Lurgi says it is close to a sale in Europe. Unfortunately for these manufacturers, chemical cost is predicted to remain stagnant for the next couple of years, which could hamper sales efforts.

The situation for chlorine dioxide generating equipment is very interesting at this time. Mills that have installed an $E_O$ stage have reduced $ClO_2$ charges, thus freeing capacity for use elsewhere. Some have directed the extra chemical to papermaking systems for biological retardation, while others have merely shifted $ClO_2$ further up the line. A TAPPI subcommittee report stated that in 1983 some 20 mills worldwide have C-stage substitution levels in excess of 25%. Last year's survey found 12 mills in North America using this technique.

*Pulp & Paper* was fortunate to have interviewed Kemanord in Sweden just before this issue went to press. That country is currently reviewing environmental permits for pulp mills—an event occurring every ten years or so—and two mills have received their new limitations. It seems that studies of the Baltic Sea have revealed excessive levels of toxic chlorine compounds, possibly affecting the life cycle of the area (evidence found includes a correlation of baby seal death and expanding toxicity). A joint effort is being undertaken by Finnish and Swedish authorities, and from the looks of the new permits, major reductions in effluent discharge having worldwide effects could be forced upon the industry. A Jaakko Pöyry release described a meeting attended by the top minds in bleaching where the discussion prophesied the Swedish government could mandate intensive effluent treatment for all discharges and/or require a fixed kappa number for chlorination.

The two mills mentioned above are located in south-



**New membrane plant cell room at Occidental Chemical Corp., Taft, La., was part of a $30-million project.**

ern Sweden, and each has been asked to reduce its discharge of total organic chlorinated compounds (TOCl) to one-half present levels (ranging from 1.5 to 2.0 kg/day). It should be noted that Swedish pulp mills currently use oxygen (in 70% of all tonnage) more than any other country (including their Baltic neighbor, Finland) and thus produce fewer chlorination byproducts. Chlorine charges are typically in the 30 to 35 kg/metric ton range, and now need to be cut by two-thirds (10 to 15 kg/metric ton). Therefore, a lot of $ClO_2$-generating capacity is available, and high C-stage substitution is possible. The situation is not the same in North America or Finland.

Should the studies prove that the toxics are connected with the chlorination stage in pulp mills, most mills will need to pursue ways to eliminate these discharges. In North America, this would mean the expansion of current $ClO_2$ generating plants, either by retrofit or small-scale design and installation. Capital investment would direct the decision. Then the high substitution levels that have been highly publicized in the literature or intense prebleaching concepts would be adapted in most locations. Kemanord believes that these developments have wide implications and is actively involved in this study.

Chlorine should not be counted out yet. It is still a fairly inexpensive, easily delivered and applied chemical, and its availability is vast. Last year Douglas Reeve presented a paper on the development of a laboratory-scale device that has given favorable results. *P&P* is closely following this work.

**PROCESS CONTROL.** Perhaps the largest and steadiest growth in sales to North American bleacheries is in process control equipment. Mills are very interested in gaining all the data necessary to make a sequence modification and, once that is accomplished, in finding out exactly what the return is. Brightness and residual chemical sensors, already having replaced ORP meters in the C-stage, are now being applied to the latter stages. In that interview with Kemanord, it was noted that mill trials in Sweden have provided data that show the final two stages are actually more important than initial bleaching. Should this attitude prevail, it would further support the conclusion that use of sensor and control equipment in bleacheries will remain strong.

An inquiry to Eur-Control USA revealed another interesting trend. Eur-Control reported that its Opticon Consistency transmitter is a "hot item" as mills seek to gain information continuously not only on washing efficiency but also on stock consistency control for washers. This product seems to fit well with the market direction of bleach plant equipment development stated above.

Eur-Control also reaffirmed *P&P*'s assessment of oxygen delignification and good overall growth in bleaching apparatus purchases (including mixers). Their products in those applications continue to show strong signs of increased usage. All these units tend to pay for themselves over a short time period (similar to mixers) through savings in bleaching costs. There are a number of suppliers in this area and previous contacts have indicated a similar viewpoint.

Supervisory control has also been beneficial for many mills, but so far only for those with the large amount of capital required. Measurex and AccuRay tend to be the leaders in sales since their product lines encompass brightness and residual sensors as well as the computer control and monitoring hardware and software. Growth of sales may depend on how well the industry performs in the short term, but it is believed that the larger mills (500 tpd) will eventually find the necessary capital to install supervisory control systems.

**FURTHER STUDY.** Several studies have been conducted to assess processes to effectively treat the effluent loads produced by today's chemical bleacheries. However, only one mill in North America has attempted a closed-cycle pulp mill and that appears to be a failure, although significant knowledge and insight are now available about the concept because of the mill trial. Work continues in the ultrafiltration, reverse osmosis, and ion exchange areas, but still without industry application. Many mills have implemented programs to curtail some effluent discharge through recycling of filtrates. The survey showed chlorination filtrates are getting applications in brownstock washing, oxygen prebleaching, and countercurrent cycles by a large number of mills. This has been a standard for all new lines for quite a while.

A study was released by researchers at Paprican at the 1985 TAPPI Pulping Conference on the results of analysis of filtrates taken from ultrafiltration and reverse osmosis treatment of bleach plant effluents. Three streams were produced and their concentrates were separated using diafiltration techniques. The reverse osmosis filtrates were found to be suitable for bleach plant recirculation. Chloride-rich filtrates processed through diafiltration were determined to have potential in generating sodium chloride and chlorine dioxide, while the organic material could be incinerated. ■